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ABSTRACT

The development of external studies programs in higher education, utilizing instructional design technology, is hypothesized to require the interaction of faculty content experts and curriculum specialists in a special type of development process. A model is proposed to include: (1) delineation of individual roles, (2) specification of the variables affecting model implementation and team interaction, and (3) specification of the steps involved in implementing a structured curriculum model in the development of higher education packaged courses. Model utility and feasibility, as tested in the pilot development of external studies courses at the University of Pittsburgh, are discussed. (Author)

A MANAGEMENT MODEL FOR TEAM DEVELOPMENT OF SELF-INSTRUCTIONAL HIGHER EDUCATION CURRICULA ON THE STRUCTURED CURRICULUM MODEL

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A MANAGEMENT MODEL FOR TEAM DEVELOPMENT OF SELF-INSTRUCTIONAL HIGHER EDUCATION CURRICULA ON THE STRUCTURED CURRICULUM MODEL

by

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The recent initiation of programs such as the innovative British Open University for the provision of non-resident, credit instruction for adults has introduced a new problem into the university setting. This problem is one of evolving a systematic procedure for the development and packaging of effective instruction for such a program.

The purpose of this paper is to describe a course development model evolved for guiding the development of non-resident, self-instructional courses for the University External Studies Program currently being conducted at the University of Pittsburgh. This is basically a management model for team development of curricula, which describes the number, type, and roles of the individuals involved in the development process, the instructional design model implemented, the sequence of steps followed by each member of the team in the development and/or review of the curricula, and the pattern of interaction of the team members.

Based on the history of curriculum development, this paper defines the need for the management model, and in particular, identifies the problems of initiating structured curriculum development activities in the university setting. This is followed by a presentation of the model itself, a discussion of the individual aspects of the model, the feasibility of the model when used as the basis for course development in the particular

setting of the University External Studies Program, and the problems associated with its implementation. The paper concludes with a discussion of recommendations for the use and improvement of the model.

Need for the Model

The 1960's after Sputnik witnessed a proliferation of curriculum development activities at a number of educational levels. Many of these activities were carried on as major projects in R&D centers and universities across the country. Typically, they were characterized by the gathering together in a federally or foundation-supported project, of number of subject matter experts for a concentrated period of time for the sole purpose of designing and pilot-testing an entire elementary or secondary curriculum in a particular subject area. IPI math and reading, PSCC Physics, and BSCS Biology, are exemplary products of such activities.

Out of these projects evolved as well a number of different models or model adaptations which were employed as the base for the systematic design of these curricula. These models were distinguished by three characteristics: (a) their novel existence as attempts to convert the somewhat mystical "art" of curriculum design into a systematic process which could be carried on as a large-scale effort by a group of curriculum writers; (b) their incorporation and utilization of the growing body of knowledge in learning, instructional and evaluation theory emerging from work being conducted at the R&D and other university settings; and (c) their additional implications, not simply for the design of curricula, but for the goals, conduct and administrative management of instruction. One of these models, called the "structured curriculum model" (Lindvall and Cox, 1969),

was developed as part of the R&D work conducted by the Learning R&D Center at the University of Pittsburgh.

Most of the large-scale development efforts based on application of the new instructional design models occurred at the elementary and secondary levels of education. Little attempt was made to extend these development efforts or apply these models to the more sophisticated subject matters of higher education.

In recent years, however, a number of pressures have been brought to bear upon American colleges and universities to undertake major changes in both the method and content of higher education. These have included, among others, demands for the increased accountability, efficiency, accessibility, and relevance of higher education in light of changing career and job opportunities, societal needs, and funding and job promotion realities. One of the most recent pressures has been to encourage the provision of access to higher education to a population hitherto isolated from higher education: the working adult, prevented by physical distance, irregular working hours, or family responsibilities from regular attendance of day classes, or part-time night school; the physically handicapped; the working poor. This pressure evolved as the result of a recognition of the relative failure of previous university efforts, such as the development of correspondence instruction and part-time evening continuing or extension education programs, to provide the access needed by this population to accredited, higher education degree programs of a quality comparable to resident, full-time instruction.

In attempts to meet this need and resolve the problems of access to quality higher education, a number of institutions of higher learning have initiated some type of external or non-resident study program for adults.

One of the most extensive and well-known examples is the new British Open University. A more modest example is the University External Studies Program initiated in June of 1972 as part of the School of General Studies at the University of Pittsburgh.

In terms of curriculum development, the significance of these new programs is that their advent has required the use of new forms of instructional packaging and delivery and the resultant application of an instructional design technology previously unapplied at the university level.

University External Studies Program

The University External Studies Program (UESP) was initiated in June of 1972 with the intent of pilot-testing the feasibility of offering non-resident study for adults at the University of Pittsburgh. The goal of the program was to provide education to a new population, one previously isolated from access to higher education. To reach that population, it was recognized that courses presented through the program would have to be "packaged" in a manner novel to higher education: courses would have to be self-instructional and pose minimal restrictions on students in terms of time and place of study. Courses would therefore have a minimum of on-campus class meetings.

It was likewise recognized that if the program was to succeed, course content would have to be packaged in such a manner that it would be instructionally effective as well as stimulating to the student. Because of the lack of regular class meetings in such a program, students would basically have to rely on the content package to mediate the course content, as well as to provide motivation for continued study. It was therefore imperative that the procedures utilized in the development of the course

packages reflect the most current knowledge of instructional theory and technology and its applications to the design of curricula, so as to maximize the instructional effectiveness and interest value of the instruction.

Finally, in terms of the feasibility of undertaking and coordinating the development of courses for such a program, it was recognized that the development process should be both systematic, and include the use of an instructional design model. This model, in turn, should (a) reflect and incorporate what is currently known about learning, instructional, and evaluation theory, (b) have been demonstrated to be an effective model for the design of individualized self-instruction at the higher education level, and (c) be feasible in terms of the development setting (time, place, and expertise constraints) of UESP.

The Instructional Design Model

On the basis of the criteria presented above, a process model for the design of individualized structured curricula (PIC) evolved by D.T. Gow (1972) was selected to serve as the basis for the instructional development of the UESP courses. This model, an adaptation of the structured curriculum model (Lindvall and Cox, 1969), was judged particularly promising because of its strong incorporation of experience acquired from educational R&D, particularly in the areas of content, concept, and component analysis, structure of the discipline, hierarchy construction, and application of instructional and evaluation theory. The PIC model had also demonstrated its feasibility for use in the design of higher education curricula.

Management Model for Course Development

Once the PIC design model had been selected as the ideal toward which the program development effort should aim, the next task lay in the establishment of a management model or system for structuring and conducting the course development effort to permit implementation of the PIC design model within the novel context of the development setting. The design of this management system had, therefore, to take into account the basic characteristics of the development setting.

Development Setting

There were certain "factors" inherent in the UESP setting which acted to delimit both the type of development process which could be conducted to permit implementation of the PIC model, as well as of the number and type of individuals who would be involved in the process. One of these was the university location of the program.

For credit obtained through a non-resident program to have credibility and transferability, the program itself must establish its credibility. Instruction presented through such a program must therefore be judged by the academic community to be "equivalent" to its counterpart in the regular resident university curriculum in terms of content and quality of instruction, faculty participation, and examination and grading standards.

The first factor delimiting the type of curriculum development process that could be undertaken, then, was that the program curriculum had to be developed in course form by the university faculty members who ordinarily taught the courses being developed.

The second delimiting factor was, of course, the PIC instructional design model itself. Use of an instructional design model as the basis for

the design of instruction was felt to be imperative to the development of effective instructional packages, since it could be assumed that few faculty members would have had much practical background experience in the design and packaging of individualized self-instruction. It could also be assumed, then, that few faculty members would have had any experience in using this particular model. It became obvious that course development would have to entail a team development process involving at least one faculty member as content specialist, and one instructional specialist knowledgeable in the application of the design model.

A third delimiting factor was the scale and pilot-test nature of the program. The University External Studies Program as initiated was of minor scale. Only five courses were to be developed for the first term of the program, with an additional five courses for the second term. Furthermore, as a pilot test program, UESP was guaranteed only one year of existence. It was therefore deemed inappropriate to consider the production of any non-print media which would require more expensive and long-range development, such as instructional television, video-tape, or films. The development process was therefore limited, during the first year of the program's existence, to the development of instructional packages consisting of basically print materials. Although the use of non-print media was not excluded from consideration, its implementation in the course development process was restricted to the selection of already existing media packages.

The fourth delimitation was the necessity of developing a certain minimal number of components to be included in the program, components identified by the program staff as being essential to the success of non-resident instruction. These included:

a) an introductory section providing the student with

study directions and information on course requirements, goals, examinations, etc.

b) a series of course study guides or units to provide structure for the student's progress through the course;

c) all materials needed for the course contained within the course "package," i.e., textbooks, written lectures, exercises, etc.

d) a final course examination administered in a formal, supervised setting, and/or the inclusion of the same type of evaluation procedures normally used in the course counterpart in resident study;

e) a minimum of three on-campus sessions to permit student-student and student-faculty interaction, formal testing, and materials distribution.

Model Description

In light of these delimitations, a management model considered as "ideal" for the development of higher education curricula for the UESP program based on the PIC structured curriculum model was constructed. This management model appears as Exhibit 1 on the following pages. As can be seen, this model describes the major aspects of the course development process: (a) the number, types, and roles of the individuals involved; (b) those development tasks to be performed sequentially by the course instructor in implementing the PIC structured curriculum model in the design of the course; (c) those steps to be followed by the instructional specialist in managing and monitoring the course development process, as well as in reviewing the instruction being developed; and (d) the pattern of interaction of the individuals involved in the development process, including the frequency and sequences of the development and review activities.

The management model portrays course development as a process

EXHIBIT 1

A. Preliminary overview by program director of design model and process
B. Initial meeting between instructor and instructional specialist (IS)
   a. Assessment by IS of entry skills, attitudes, and needs of instructor
   b. Delineation of roles and specification of interaction patterns
   c. Clarification of design model in detail by IS
   d. Tutorial as needed by IS on individual steps of design model
   e. Specification of preliminary work plan
   f. Preliminary discussion of course content, goals, organization, unit format, etc.
C. Instructor first-draft specification of
   a. Course content and concepts (content and concept analysis)
   b. Overall course objectives (component analysis), and hierarchy of these terminal objectives
   c. Course organization
   d. Rationale for course
   e. Division of content into units or modules
   f. Unit sequencing
   g. Unit format
   h. Preliminary scheduling of unit development
   i. Textbooks or articles needed for course
D. Review by IS to include:
   a. Review of existence of necessary components
   b. Critique of instructor's choice and sequencing of unit content, concepts and objectives in terms of accuracy and feasibility
   c. Specification of revision points, with examples as needed
E. Meeting with instructor and IS to discuss revisions needed and practice design skills
F. Revision of work by instructor as needed
G. Review of revisions by IS as needed (Recycle steps E-G if additional revisions needed)
H. IS construction of course development record and conveyance to production coordinator of need to order textbooks
I. Instructor selection of unit to be developed, and first draft of unit, including:
   a. Specification of objectives
   b. Construction of objectives hierarchy and sequencing
   c. Construction of unit pre and posttests, and of item pool for course pre and posttests, including scoring keys
   d. Writing of unit rationale
   e. Specification of instructional strategies, media and methods
   f. Specification of unit prerequisites
   g. Construction of study guides, with objectives, tasks and sources coded to objectives, and answer keys
   h. Construction of bibliography
   i. Writing and/or selection of unit sources materials, including instructor-written lecture or overview
J. IS review of unit, including: (Recycle steps E-G until unit approved by IS, then to step K)
   a. Check if objectives correctly written and sampling all desired levels

of taxonomy; if objectives sufficient and appropriate in light of unit materials
   b. Check of logical and psychological validity of hierarchy
   c. Check of content validity of pre and posttest items, of existence of semantic cuing or other item construction faults
   d. Check if materials available for attainment of each objective; if practice exercises available for all objectives of application level and above
   e. Check if unit is self-contained, or if are prerequisites that have not been taken into account
   f. Check clarity of language, format, and directions: understandability of unit
   g. Check presence of all components and consistancy with unit format
   h. Edit of grammar, text as needed
   i. Check on necessity of procuring copyright permissions for any articles included in unit; if yes, conveyance of information to production coordinator

K. Pilot test of unit on sample student
L. Student/instructor meeting to discuss unit revisions needed
M. Instructor revision of unit as needed
N. IS final review of unit with revisions made
O. Revision of work schedule as needed
P. Unit selection (Recycle steps I-O until all units completed, then to Q)
Q. Instructor construction of course pre and posttests
R. IS review of tests to check validity, reliability of tests, as well as if a balanced sampling of the course objectives
S. Instructor writing of initial introductory study directions for students, to include:
   a. Introduction
   b. Course rationale and goals
   c. Study directions
   d. Discussion of on-campus sessions, examinations, and instructor contact
T. IS review to ensure existence and clarity of all components
U. Instructor preparation of agenda, format and materials for on-campus sessions
V. IS review to ensure feasibility of all activities, and ordering of all special props needed (films, equipment, etc.)
W. Final review of all units by instructor and IS

involving the interaction of two individuals: the faculty member responsible for the preparation of the course, and an instructional specialist on the UESP staff. A role of a student pilot test subject is also included in the model, but the part played is minor.

The role of the faculty member in this team is that of course author and content specialist. The role of the instructional specialist is varied, encompassing simultaneously the functions of instructional design expert, instructional reviewer, critic and editor, idea generator, problem solver, general coordinator of the course development process, and liaison with the materials production staff. It is the particular task of the instructional specialist to see that the instructional design model of the program be implemented to the fullest possible extent.

The management model was considered "ideal" for a number of reasons. First of all, if implemented, it would result in the successful implementation of the PIC structured curriculum model. Secondly, the systematic review process would guarantee the effectiveness of and elimination of error in the course materials. Thirdly, the development process was relatively economical in terms of the number of individuals involved. A single instructor would be responsible for development of an entire course, rather than a group of individuals simultaneously developing different segments of the same course, as was reported to be the cause of problems experienced at the British Open University (Lewis, 1971). Therefore, a great deal of time and effort that would otherwise be spent in training the additional instructors, in coordinating their efforts, and in dealing with the unavoidable conflict, revisions, and compromises which of necessity occur with group efforts would be saved. Furthermore, by having a single instructional specialist responsible for coordinating all aspects of a course

development, redundancy of effort and communication would be avoided.

Model Implementation Expectations

It was not anticipated that the course development procedures described in the management model would be implemented exactly as desired during course development for the first or even second terms of the program. It was recognized that the ability to implement the model would depend on a large number of variables, some of which would initially be beyond the control of the program. These included:

a) the amount of time allotted for course development;

b) the initial, accurate understanding on the part of the faculty member of the magnitude and type of the development task and his degree of committment to and general attitude toward that task;

c) the faculty member's degree of expertise in his specialty, and need for others to help in the design of course segments;

d) the faculty member's previous experience with the systematic design of instruction and/or with the particular design model, as well as the existence of any preconceived opinions for or against such models;

e) the expertise of the instructional consultants in working with faculty members and in personally implementing the design model;

f) the number of courses being handled simultaneously by the instructional specialist, and the IS's ability to coordinate these efforts;

g) the interpersonal skills of both the instructional specialist and the faculty member, and the type of working relationship established; and

h) the number of support staff available to the instructional specialist.

It was expected that the model might not be applicable at all in some of the courses, due to operation of a combination of these constraints. It was expected, however, that this model would provide general, if not specific,

guidelines for the development of most of the initial courses of the program, and that as experience with the model was gained, it would be both possible and desirable to implement it to increasing degrees.

Specifically, it was anticipated that the number and roles of the individuals involved, as defined initially, would be able to be maintained throughout the course development process in the initial terms. It was also anticipated that the basic interaction pattern, i.e., the general sequence of development and review, would hold true for those courses which attempted to implement the instructional design model. It was not anticipated that the PIC instructional design model with all its steps, and in its pure form, could be implemented during the initial terms of the program.

Model Implementation

The expectations concerning model implementation and constraining variables were verified by the course development experience of the first and second terms of the program.

In the initial development phase, for example, a number of the variables defined above were manifested in a manner negative to full implementation of the management model for course development. There was, for example, only a two months development period prior to the beginning of the instructional term. Furthermore, although one of the faculty members was an expert in the model, and a second had had some degree of experience with certain components of the model, the remaining three faculty members were unfamiliar with such instructional design procedures. Also, while three of the instructors were enthusiastic about the potential and opportunities of implementing such a course development process, two of the instructors were disinterested in attempting such a process. It is interesting to note that

both of these were experts in their field, had had a great deal of teaching experience, and had developed and taught their particular courses previously within the traditional resident curriculum. In addition, it was the beginning of the program, and the instructional staff was new and relatively inexperienced in applying this model in the team development of curricula.

During the initial term, then, the attempt was made to implement the course development model with only three of the five courses. In the other two courses, an extremely modified form of the development process occurred. In lieu of a process of individual unit construction, for example, with periodic review by the instructional specialist, the materials for the courses were prepared by the course instructors as single packages, and reviewed as a whole by the instructional specialist when the instructors had completed their work. The review by the IS at that point was simply to ensure the presence of what were considered to be the minimal instructional components, as these were described earlier (pp. 7 & 8), as well as to edit and ensure the general clarity and understandability of the course materials.

During the second term development phase, the variables operating within the development setting were more favorable to the implementation of the development model. The development period was longer, beginning approximately four months before the new term. The instructional specialists were more experienced in model implementation. Also, the use of this process for the development of the courses was presented as part of the initial agreement made with all instructors. A further positive factor was that two of the instructors had developed courses for the first term, and therefore had experience with implementing the development model. On the basis of the first term's development experience, it was also possible for the instructional specialists to better convey to the instructors the magnitude

of time and effort which would be involved in the development process. This prompted the instructors to set more realistic guidelines for themselves. Also, none of the instructors involved in the second term development had preconceived, negative notions about the implementation of such a development process. Rather, they welcomed it as an opportunity to acquire new expertise in course development. A final factor which proved very helpful in making possible the development and review process was the increased size and experience of the materials production staff.

For the second term, then, the attempt was made to implement the course development model as conceived in all of the five courses being developed.

Results

In those eight courses where the attempt was made to implement the course development model, the results were basically as anticipated. The roles of the individuals as originally identified proved to be valid in terms of actual implementation, with the instructor as author and the instructional specialist as development manager, instructional reviewer, and editor. In only a few instances was it necessary for the instructional specialist to actually write portions of the units, and this normally took the form of rewriting objectives or test items. The interaction pattern of the individuals was also implemented basically as presented in the management model.

The area in which the development model was not implemented to the degree desired was in implementation of the PIC instructional design model. In only one course was the PIC design model fully implemented. This was the one course where the instructor was already an expert in the implementation of the PIC model. In the other seven courses, although the basic components

of the structured curriculum model were included in one form or another, those design steps which were the distinguishing features of the PIC adaptation of the structured curriculum model were generally not implemented. Exhibit 2 presents a description of the adapted, abridged curriculum development process that actually occurred in the development of those seven courses. Comparison of this process with the original development process model (see pp. 9 & 10) permits identification of the changes made.

Most of these changes involved the omission of certain steps of the PIC model. These omissions basically represented the instructor's failure during initial course development to carry out the detailed concept, content and components analyses, and the construction of the hierarchy of terminal objectives which would serve as the basis for the sequencing and division of the content and objectives into units. Within the units themselves, these same steps were generally omitted: the concept and components analyses, the construction of the objectives hierarchy, the identification of prerequisite objectives, and the systematic specification of instructional strategies, media and methods appropriate to each objective.

As can be seen from the revised development model, it was not generally possible to include the student pilot test. This was a time factor, and the pilot test was actually implemented in only one course. The pilot test did prove, however, to be an effective aid in detecting errors or weaknesses in the instructional materials.

None of the courses followed the model in terms of completing all units before the beginning of the instructional term. Generally those units needed for the first half of the course were completed by the beginning of the term, and the remainder of the units were completed in time to be handed out at the second on-campus session. There were

EXHIBIT 2

A. Preliminary overview by program director of design model and process

B. Initial meeting between instructor and instructional specialist
   a. Assessment by IS of entry skills, attitudes and needs of instructor
   b. Delineation of roles and specification of interaction patterns
   c. Clarification of design model in detail by IS
   d. Tutorial as needed by IS on individual steps of design model
   e. Specification of preliminary work plan
   f. Preliminary discussion of course content, goals, organization, unit format, etc.

C. Instructor first-draft specification of
   a. Division of content into units or modules, and sequencing
   b. Preliminary specifications of unit format
   c. Textbooks needed for course

D. IS review, construction of course development record, and conveyance of information to production coordinator of need to order textbooks

E. Instructor selection of unit to be developed, and first draft of unit, including:
   a. Specification of objectives
   b. Construction of unit pre and posttests, or of sample test items, plus scoring keys
   c. Writing of unit rationale
   d. Specification of tasks and sources
   e. Writing and/or selection of unit materials (articles, readings, or instructor-written lecture or overview)

F. IS review of unit, including:
   a. Check if objectives correctly written and sampling desired taxonomy levels
   b. Check if objectives sufficient and appropriate in light of unit materials
   c. Check content validity of all test items and tasks, including item construction faults (e.g., semantic cues)
   d. Check if materials available for attainment of all objectives; if practice exercises available for all objectives of application level level and above
   e. Check if unit is self-contained, or if there are prerequisites that have not been taken into account
   f. Check clarity of language, format and directions, understandability of unit
   g. Check presence of all components and consistancy with unit format
   h. Edit of grammar, text as needed
   i. Check on necessity of procuring copyright permissions for any articles included in unit; if yes, conveyance of information to production coordinator

G. Instructor revision of unit as needed

H. IS review of unit revisions (Recycle steps G & H until unit approved by IS)

I. Revision of work schedule as needed

J. Unit selection (Recycle steps E-I until all units approved)

exceptions, of course, but they involved only one or two courses.

Because the units were not completed before the beginning of the term, it was also impossible to construct course pretests. The one exception was the course which implemented the PIC model, where the pretest could be based on the terminal objective hierarchy constructed at the outset of the course development. Also, steps Q-V of the original design model generally occurred before the completion of all units, i.e., the construction of examinations, the preparation of the introductory materials for the students, and the planning of the interaction sessions.

Conclusions

A number of conclusions can be drawn as a result of the experience with the course development model. First of all, implementation of such a team management model is feasible in the university setting. It provides extremely useful guidelines for the conduct of the course development process, both for the course instructor and for the instructional specialist. Given the right conditions, these guidelines can be followed, and, as is evident from the instance of the one course, the management model does permit the implementation of the PIC instructional design model.

It is also apparant, however, that certain conditions are necessary to enable full implementation of the course management model. A minimum amount of development time is a necessity. A reasonable estimate of that would be 6-8 months for the development of a 3-credit, undergraduate course, with the instructor working quarter-time. Development of a graduate-level course would probably take longer. Instructor attitude is also extremely important. Degree of instructor expertise in instructional design, and the interpersonal and design skills of the instructional specialist, are also decisive.

Secondly, implementation of the course development model appears to result in the design of a more effective course, as assessed by instructor and student opinion. Instructors who implemented the development and review process specified by the model were very positive in terms of the effects they felt this had on improving the quality of their courses. Students rated those components which resulted from implementation of the structured curriculum model very highly, and commented positively on the degree of structure provided by the model implementation. It is also apparant that the systematic design and review process eliminates many errors in the materials, such as omissions of needed materials, and arbitrariousness in testing course objectives. (Yeager, Morrow, Cohick, Davis, & Mullig, 1973)

The systematic development procedure also makes possible the rapid production of high-quality instruction, and is economical in terms of the number of persons involved. After the development and review of the first few units, the instructor tends to learn and implement the review process normally carried out by the instructional specialist, and therefore corrects most errors before the materials reach the instructional specialist for review. This would not occur, of course, where more than one instructor is involved in the design of a single course.

By assigning responsibility for monitoring and coordinating the development effort to one instructional specialist per course, much confusion is also eliminated. The course development record for monitoring the progress of unit development is also a useful procedure.

Problems

There are, however, also a number of considerations or potential problems involved in implementing a course development model of this sort. One of

the major potential problems associated with such a model is the tendency to insist upon its overly strict implementation, in all instances with all courses. This is particularly true with regard to requiring the implementation of all aspects of the PIC design model incorporated within the management model. While it is entirely proper and highly desirable that such a model exist and be implemented in a program such as the UESP, to insist upon its complete implementation in the development of all courses is to eliminate the flexibility of the program in dealing with individual faculty members. One of the goals of the program is to establish academic credibility. To achieve this, reputable faculty members must be attracted to teach the courses. Insistance by the development staff on the rigid application of all the components of the development process can alienate reputed faculty members who are both excellent instructors and capable of developing excellent courses on their own. Therefore, while it is desirable that the attempt be made to fully implement the management model, and minimally, to guarantee that certain components necessary to self-instruction be included, it is very questionable that the strict implementation of this model is in all cases the most positive manner of dealing with course development. Degree of model implementation must be left to the judgment of the instructional specialist, who must evaluate the case of each faculty member individually based on her or his own development experience.

A further problem associated with the implementation of such careful and detailed design procedures is that it has yet to be demonstrated that the resulting curricula are sufficiently more effective as to warrent the additional investment in time and money. Part of the problem may be an evaluation problem, since most evaluations of student success, when comparing effectiveness of curricula, are based on the assignment of grades

rather than on criterion-referenced measures of objectives attainment. Until this problem can be resolved, and curricula developed according to such models can be proven more effective, it will be difficult to justify the additional costs in terms of time, staff requirements, and funding. It is, however, useful to note in this argument that students taking courses designed using the structured curriculum model express very positive attitudes toward the course structure and components that result from implementing a structured curriculum model. (Yeager, et al., 1973)

A third problem mentioned earlier, is that the development model as presented is particularly directed toward the development of basically pencil and paper materials. It does not currently include the additional roles of the instructional and technical experts who would necessarily be involved if other media were being utilized. That does not mean that these elements could not be added to the model at some later date, when the use of these media would be feasible in terms of project size and budget.

A final problem associated with the use of such development procedures is that they require a long development period, as well as the existence and availability of instructional specialists trained in the use of the model. At present, such specialists are difficult to find. This means that a significant effort to provide on-the-job training must be made to train the specialists required to implement the model.

Recommendations

On the basis of the experience gained in implementing the management model, a number of recommendations can be made as to its future usage:

1. Use of a management model for course development such as the one described here is both feasible and desirable in

the development of courses for non-resident higher education. The model should, however, be used with discretion, and flexibility in its application should be maintained. This is the only way that use of such a model will be palatable in higher education.

2. A longer period of time should be allotted if it is expected that the model can be fully implemented, particularly the PIC version of the structured curriculum model. A minimum of six months must be allowed.

3. If this model is to be implemented in the context of a larger development effort, i.e., the development simultaneously of a large number of courses, it is recommended that a number of workshop sessions be held to familiarize instructors with use of the model. This should economize on the amount of time spent in initial demonstration to the instructors at the beginning of each course, which is now done on an individual basis. This will be particularly necessary in cases where more than one instructor is involved in designing segments of a single course.

4. It is highly desirable that a minimum of one pilot test be included among the course development procedures.

5. One of the problems associated with course development of this sort is the case of individual instructors who fail to plan their time correctly and keep to their work schedule. Instructors may desire to alter the course development commitments, as other activities become more "pressing." It is therefore recommended that some type of formal or informal written agreement be drawn up with each instructor, in which the instructor agrees to maintain the standards set by the program in terms of following the development procedure and completing his course within certain time limits. Payment of the instructor should be based upon completion of the original agreement.

6. It is also recommended that a role be included in the development process for a materials editor. This is particularly relevant in courses where an instructor writes his own lecture material. This would streamline the development process and make it possible for the instructional specialist to work with more courses at a given time.

7. A final recommendation concerns the relationship between the instructional specialist and the individual course instructor, which can be crucial to the effective implementations of the team development process. The assignment of the particular instructional specialist to work with a given course instructor should therefore be based, where possible, on a matching of personalities, interests and problem solving approaches.

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